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Mycoherbicide Research and Development for Integrated *Striga* Control in Africa: Achievements, Constraints and Future Perspective

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Abstract

Striga spp. are important constraints in cereal and legume production in semi-arid tropical Africa, where the livelihood of millions of subsistence farmers is adversely affected. An integrated approach in which biocontrol represents an important component, appears to be the ideal strategy for reducing *Striga* infestation. *Fusarium oxysporum* (Foxy 2 & PSM197) proved to be highly virulent against their target weed *Striga hermonthica*, host specific and they can be mass-produced. For facilitating practical field application, our research focuses on the development of appropriate mycoherbicide formulations and delivery systems of the fungal antagonists. Hence, Pesta formulation, made by encapsulating fungal inoculum in a matrix composed of durum wheat-flour, kaolin, and sucrose, was developed. Seed treatment technology for coating sorghum and maize seeds as an attractive option for further minimising the inoculum amount and facilitating delivery of *Striga*-mycoherbicides was also investigated and an optimised coating protocol for antagonists of *Striga* was provided. Both formulations showed promising efficacy in controlling *Striga* and in improving the panicle yield of its host plant sorghum under glasshouse conditions. Integration of Pesta formulation and treated seeds containing *Striga*-mycoherbicides with *Striga* resistant and susceptible sorghum and maize cultivars under field conditions revealed an additive effect. The resistant cultivars enhanced clearly both mycoherbicides efficacy in controlling *Striga*. These findings are highly relevant to the realisation of an integrated *Striga* control approach. Both technologies “Pesta and seed treatment” offer a significant practical and economical solution for large-scale application of antagonists for *Striga*. Further, both mycoherbicides maintained excellent viability (shelf-life) on Pesta products and treated seeds after one year of storage which would be sufficient for their use under practical conditions of storage, handling and delivery. The compatibility and suitability of Pesta and seed treatment technology for formulating and delivering *Striga*-mycoherbicides will contribute to solving the primary difficulties for underemployment of *Striga*-mycoherbicides in Africa. Strategies about how to utilise these progresses to formulate successful integrated *Striga* control methods adoptable and applicable by subsistence farmers were proposed.

Keywords: Encapsulation, *Fusarium oxysporum*, Future prospective, Integrated approach, Mycoherbicide, Seed coating, *Striga hermonthica*, weed biological control